Adoption Analysis and Impact Evaluation of Potato IPM in Ecuador

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Introduction

- Farmers in Ecuador use large quantities of pesticides and chemical fertilizers.
- Potato is a crop with relatively high input requirements and also a very important staple in the average Ecuadorian diet.
- Carchi is currently the most important potato production area of the country (43% of the production using only 13% of the total national area dedicated to this crop).
- Carchi was one of the IPM CRSP's primary research sites in Ecuador.

Objectives

- To establish and estimate the relative contribution of various factors affecting IPM adoption.
- To determine why IPM adoption has occurred over time.
- To evaluate the environmental impact of potato IPM adoption by determining whether the implementation of IPM technologies has reduced pesticide expenditures.

Figure 1. Ecuadorian potato farmer spraying pesticides in Carchi.

Methods

- Primary data was collected from 404 farmers in three municipalities in the province of Carchi, Ecuador.
- An ordered-probit estimation was used to assess factors responsible for explaining differences in levels of IPM adoption.
- The farm level decision making process on pesticide expenditures was evaluated using maximum likelihood estimation of an ordered-probit selection model [1].
- Average pesticide expenditures at each level of adoption were estimated and aggregate savings were calculated.

Results

- IPM technologies were spread through Farmer Field Schools (FFSs), field days, interactions among farmers, and other means. (Fig. 2).
- It was possible to identify changes in IPM adoption over time (Fig.3a) due to availability of a survey conducted in Carchi by Mauceri in 2003 [2].
- We found that time and farmers' perceptions of ineffectiveness of IPM techniques were limiting factors for wider adoption (Fig. 3b).

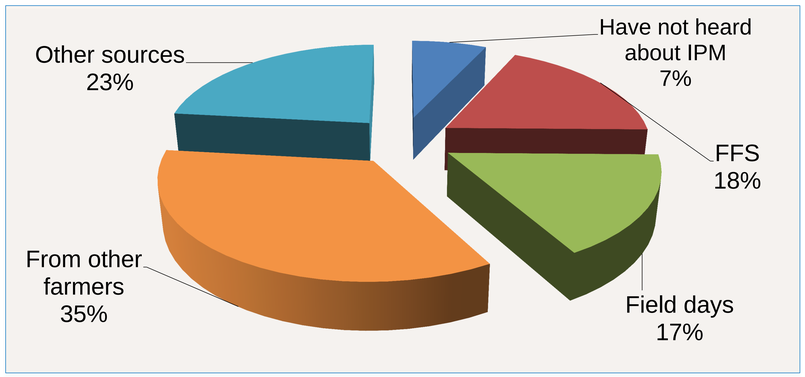

Figure 2. How farmers learn about IPM

- According to the econometric model, information sources had positive and strong effects on adoption, with certain information sources being more effective than others.
- Important factors determining IPM adoption, besides information, were wealth and farmers developing pesticide-related illnesses in years prior to the survey (Table 1).
- IPM adopters spent significantly less money on pesticides than non-adopters.
- The annual aggregate cost savings per production cycle were $823,000.

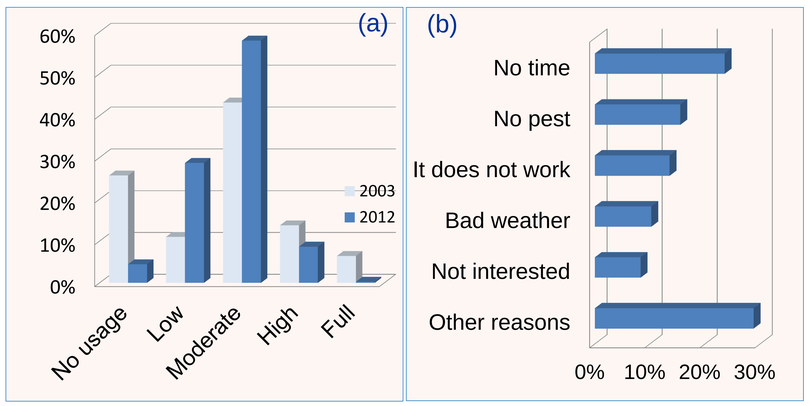

Figure 3. (a) IPM adoption over time. (b) Main reasons for not adopting IPM.

Variables	*High Adoption IPM_CTG4*		*Moderate Adoption IPM_CTG3*	
FHEALTH (sick due to pesticide use)	-0.05573*	(0.03378)	-0.01950	(0.01207)
WEALTHI (wealth index)	0.01908*	(0.01098)	0.00668*	(0.00393)
INFDIF1 (Farmers Fields Schools)	0.40102***	(0.07013)	0.14034***	(0.02570)
INFDIF2 (Field days)	0.27383***	(0.06703)	0.09583***	(0.02288)
INFDIF3 (Other farmers)	0.27170***	(0.05747)	0.09508***	(0.02132)
INFDIF4 (Other sources)	0.23408***	(0.05943)	0.08192***	(0.02144)

Significance levels: * 10% ** 5% ***1%. Standard errors in brackets

Table 1. Ordered probit –-marginal effects for significant variables

Adoption IPM Category	Mean ($/hectare)	Std. Dev. ($/hectare)
IPM_CTG1 (no usage)	814.30	441.03
IPM_CTG2 (low adoption)	363.63	159.86
IPM_CTG3 (moderate adoption)	260.38	75.84
IPM_CTG4 (high adoption)	234.31	66.48

Table 2. Predicted pesticide expenditures

Conclusions and Discussion

The adoption and impact assessment of potato IPM technologies in Ecuador suggest the following:

- Information sources (FFSs, field days, other farmers, other sources) had positive and strong effects on IPM adoption.
- Adopters of IPM spent less money on pesticides than non-adopters.
- The calculated aggregate cost savings per production cycle were $823,000.

The current analysis can be extended as follows:

- Incorporate the interactions among multiple information sources as possible determinants of farmers learning about IPM.
- Evaluate the overall economic impacts of the potato IPM program.

References

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2. Mauceri, M., Alwang, J., Norton, G., & Barrera, V. (2007). Effectiveness of integrated pest management dissemination techniques: a case study of potato farmers in Carchi, Ecuador. *Journal of Agricultural and Applied Economics, 39*(3), 765-780.

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